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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Graham Eastham

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EXAMINER

ZUCKER, PAUL A

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/589,971	<b>Applicant(s)</b> EASTHAM ET AL.	
	<b>Examiner</b> PAUL A. ZUCKER	<b>Art Unit</b> 1621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-24, 26-29 and 34-45 is/are pending in the application.
- 4a) Of the above claim(s) 13-19, 23, 24, 29, 35, 37, 39, 41, 44 and 45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-12, 20- 22, 26-28, 34, 36, 38, 40, 42 and 43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/1/2011</u> .  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Current Status***

1. This action is responsive to Applicants' amendment of 27 December 2010.
2. Receipt and entry of Applicants' amendment is acknowledged.
3. Applicant's cancellation of claims 5, 25 and 30-33 is acknowledged.
4. Applicant's addition of new claims 40-45 is acknowledged.
5. Claims 1-4, 6-24, 26-29 and 34-45 are pending.
6. The objection to the specification set forth in paragraph 3 of the previous Office Action mailed 27 July 2010 is withdrawn in response to Applicant's amendment.
7. The rejection under 35 USC § 102 set forth in paragraph 4 of the previous Office Action mailed 27 July 2010 is withdrawn in response to Applicant's amendment.
8. The rejection under 35 USC § 103 set forth in paragraph 3 of the previous Office Action mailed 27 July 2010 is withdrawn in response to Applicant's amendment in favor of the new rejection below.

=====  
***New Rejections***  
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***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-4, 6-12, 20, 21, 22, 26-28, 34, 36, and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1, 34 and 36 recite the limitation "greater than 5:1 to 95:1" in lines 7-8. It is unclear whether ratios of greater than 95:1 meet this limitation. It is therefore impossible to determine the meets and bounds of claims 1, 34 and 36. Claims 1, 34 and 36 and their dependents are therefor rendered indefinite.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-4, 6-12, 20, 21, 22, 26-28, 34, 36, 38, 40, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (US 6,348,621-B1 02-2002) when considered with Pearson et al (WO 98/41495-A1 10-1998) and Schafer et al (US 2003/0191339-A1 10-2003).

Instantly claimed is a catalyst system comprising a Group VIB or VIIB metal, a bidentate phosphine ligand and an acid in which the ration of ligand to metal is at least 2:1 and the ratio of acid to ligand is at least 2:1. The use of a polymeric dispersant is newly claimed

Wang teaches (Column 4, lines 35-59) a catalyst system comprising palladium and the bis(di-t-butylphosino) -o-xylene ligand which corresponds to the elected specie of ligand in a 3:1 molar ratio and it use in the carbonylation of ethylene in a reaction medium in the presence of methanesulfonic acid. Wang teaches (Column 3, lines 35-59) the ratio of ligand to palladium can vary within wide limits and suggests, as a non-limiting value, a ratio of 50:1. The Examiner takes the position that Wang's teaching of an unlimited ratio encompasses the instantly claimed ligand-metal ratios.

The difference between the catalyst system of Wang and that instantly claimed is that Wang teaches (Column 4, lines 35-59) the use of an approximately equivalent molar amount of ligand and acid an a ratio of at least 2:1 is instantly claimed.

Pearson, however, teaches (Page 7, lines 10-25, including Table 1) carbonylation using palladium and the instantly elected ligand. Pearson teaches (Page 7, line 25,

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Table 1, entries 3 and 4) that addition of a 10- fold molar excess acid to metal (molar amount  $\text{MeSO}_3\text{OH} = 1.37 \times 10^{-3} = (0.1 \text{ ml} \times (1.319 \text{ gm/ml})) / 96.01 \text{ gm/mol}$ ) results in an increase in product yield. Pearson teaches (Page 5, lines 1-3) ratios of bidentate ligand to palladium of from 1 to 50. Pearson teaches (Page 5, lines 25-28) anion (corresponding to acid) ratios of from 1:1 to 500:1. Pearson teaches (Page 1, lines 21-30) that the goal of his disclosure is to prolong the life and activity (turnover number) of the catalyst.

Neither Wang nor Pearson suggest the use of polymeric dispersants.

Schafer, however, teaches (Paragraphs [0015]-[0020]) a palladium/phosphine – containing a polymeric dispersant capable of stabilizing/dispersing the catalyst in the reaction mixture.

One of ordinary skill in the art would therefore have been motivated to optimize the process of Wang by the addition of excess acid to produce the instantly claimed catalyst system and reaction medium with a reasonable expectation of success. In addition, Pearson's teaching motivates the adjustment of the ligand to metal ratio in order to extend the catalyst's useful life. Further improvement in catalyst stability is obtained by using the dispersant of Schafer.

Thus the instantly claimed catalyst system and reaction medium comprising it would have been obvious to one of ordinary skill in the art.

***Examiner's Response to Applicants' Remarks With Regard to This Rejection***

11. Applicants have presented several arguments with regard to this rejection. The

Examiner responds to these below:

- a. Applicants argue (Remarks, pg.. 22, 3<sup>rd</sup> full para) that one of ordinary skill in the art would not have been motivated to optimize the process by the addition of excess acid since Pearson teaches the quantity of anion (acid) is not critical to catalytic behavior. The Examiner disagrees and points out that Pearson teaches at the cited location that the *manner of supplying* the anion(acid) is not important, not the amount of anion(acid). Applicants then proceed to undercut the argument just presented by pointing out that Pearson exemplifies an increase in yield with an increase in acid. The Examiner also notes here, as pointed out in the modified rejection above, Pearson's goal is to produce catalyst with a longer useful life.
- b. Applicants argue that other references teach away from using higher ligand-metal and ligand-acid ratios and cite locations in the present specification. The Examiner points out that these references are not at issue in the current rejection.
- c. Applicants argue that the increase in reaction rate reported by Pearson et al. cannot be compared with the increase in turnover number (TON) reported in the present application and that reaction rate measures only the amount of product produced over a period of time while TON is a measure of catalyst stability. The Examiner directs Applicants' attention to the modified rejection above which points out that Pearson teaches (Page 1, lines 21-30) that the

goal of his disclosure is to prolong the life and activity (turnover number) of the catalyst.

- d. Applicants argue that because the reaction rate cannot be compared with the turnover number, one of ordinary skill would have no expectation of improvement by increasing both the ligand:metal ratio and the acid:ligand ratio. The Examiner disagrees and points out that:
  - i. Pearson is primarily concerned with catalyst life span, not reaction rate;
  - ii. Pearson teaches ranges of ligand metal ratios as instantly claimed as pointed out in the modified rejection above.
- e. Applicants argue that given the results in Pearson et al., one of ordinary skill might foresee, or at least investigate a possible increase in reaction rate by adjusting the acid: metal ratio, but given the lack of evidence in Pearson et al., one of ordinary skill could not predict a benefit from increasing both the ligand:metal ratio and acid:ligand ratio. The Examiner disagrees since Pearson teaches ligand:metal ratios encompassing those instantly claimed.
- f. Applicants argue that, "optimizing" for reaction rate would not necessarily produce the claimed ratios. To conclude therefore that the claimed ratios would be produced by "optimizing" for reaction rate relies upon an improper inherency conclusion. The Examiner disagrees. Inherency is not a requirement for obviousness.

- g. Applicants argue that there is no motivation to adjust the ligand: metal ratio and the acid: ligand ratio to optimize for turnover number because only result-effective variables can be optimized. M.P.E.P. 2144.05(II)(B) and that neither Wang nor Pearson recognize that turnover number is a function of both the ligand:metal ratio. The Examiner disagrees since Pearson teaches ranges for both ligand:metal ratio and acid:ligand ratio that encompass or overlap those instantly claimed.
- h. Applicants again incorrectly assert (see 9a above) that Pearson teaches that "the quantity of anion present is not critical to the catalytic behavior of the catalyst system."
- i. Applicants argue that neither Wang et al. nor Pearson recognize that turnover number is a function of both the ligand:metal ratio and the acid:ligand ratio, or that the turnover number can be increased by increasing both ratios. In contrast, the application provides significant evidence showing significant turnover numbers at high ligand:metal ratios and high acid:ligand ratios. Thus, the results are unexpected, and the claims are not obvious. The Examiner disagrees since the disclosure of Pearson is directed toward increasing TON and, as previously discussed, Pearson teaches ranges for both ligand :metal ratio and acid:ligand ratio that encompass or overlap those instantly claimed.

Applicant's arguments filed 27 December 2011 have been fully considered but they are not persuasive for the reasons set forth above.

***Claim Objections***

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12. The claims are objected to because of the following informalities: An extraneous

“38.” Appears after claim 39. Applicants should delete the extraneous text.

Appropriate correction is required.

### ***Conclusion***

13. Claims 1-4, 6-24, 26-29 and 34-45 are pending. Claims 1-4, 6-12, 20- 22, 26-28, 34, 36, 38, 40, 42 and 43 are rejected. Claims 13-19, 23-24, 29, 35, 37, 39, 41, 44 and 45 are held withdrawn from consideration as being drawn to non-elected subject matter.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. ZUCKER whose telephone number is (571)272-0650. The examiner can normally be reached on Monday-Friday 5:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on 571-272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Paul A. Zucker/  
Primary Examiner, Art Unit 1621